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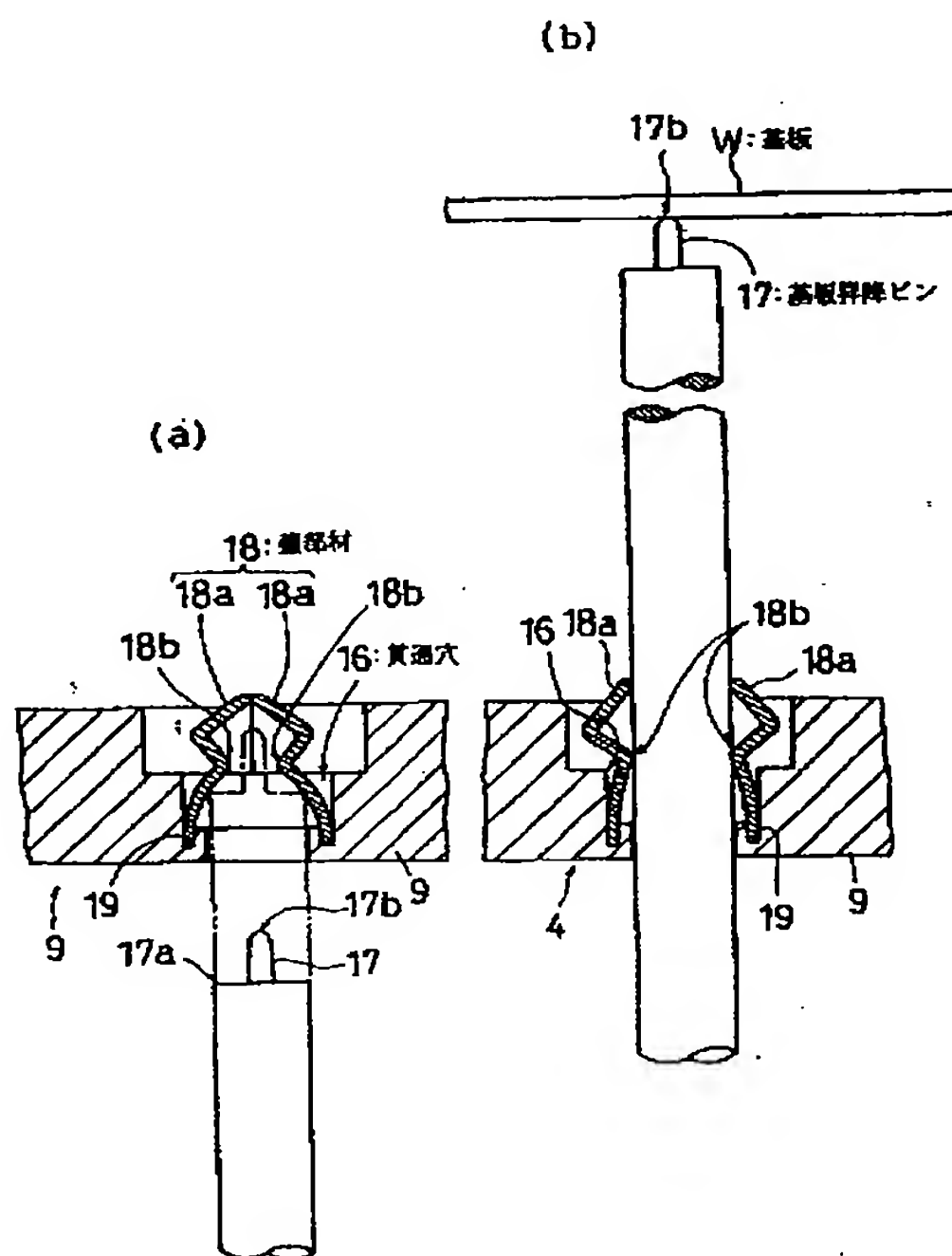
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(54) 【発明の名称】 回転式基板処理装置

(57) 【要約】

【目的】 基板裏面にチャック跡を生じさせないものでありながら、基板の搬入・搬出のために基板を昇降する構成に起因する基板の裏面や端面の汚れ発生を回避する。

【構成】 ピン状支持部材と規制部材とによって基板Wの外周縁を保持させて鉛直方向の軸芯周りで回転可能に構成する。また、ピン状支持部材や規制部材を設けた底板9と基板Wとの間に密閉状の空間Sが形成されるように構成し、底板9に貫通穴16を形成し、その貫通穴16を通じて基板昇降ピン17を昇降させ、かつ、貫通穴16に蓋部材18を設け、基板昇降ピン17を上昇するときには貫通穴16を開き、一方、基板昇降ピン17を下降引退させた状態では貫通穴16を閉塞するように蓋部材18を変位させ、基板Wを回転させるときに貫通穴16から空気が流入しないように構成する。



【特許請求の範囲】

【請求項 1】 基板の外周縁を保持する基板保持部材と、その基板保持部材を鉛直方向の軸芯周りで回転する基板回転手段と、前記基板の裏面に接触して前記基板を前記基板保持部材に保持する保持位置とそれより上方の受け渡し位置とに昇降する基板昇降ピンとを備えた回転式基板処理装置であって、前記基板保持部材を、前記基板を保持した状態で前記基板との間に密閉状の空間を形成するように構成するとともに、前記基板保持部材に前記基板昇降ピンを昇降出退する貫通穴を形成し、前記基板昇降ピンを上昇するときには前記貫通穴を開き、かつ、下降引退させた状態では前記貫通穴を閉塞する蓋部材を設けたことを特徴とする回転式基板処理装置。

【請求項 2】 基板の外周縁を保持する基板保持部材と、その基板保持部材を鉛直方向の軸芯周りで回転する基板回転手段と、前記基板の裏面に接触して前記基板を前記基板保持部材に保持する保持位置とそれより上方の受け渡し位置とに昇降する基板昇降ピンとを備えた回転式基板処理装置であって、前記基板保持部材を、前記基板を保持した状態で前記基板との間に密閉状の空間を形成するように構成するとともに、前記基板保持部材に前記基板昇降ピンを前記密閉状の空間に連なる密閉状態で昇降可能に設け、前記基板昇降ピンに当接して上昇させる押圧部材を設けるとともに、前記押圧部材の非当接状態で前記基板昇降ピンを下降させる付勢機構を設けたことを特徴とする回転式基板処理装置。

【発明の詳細な説明】

【0001】

【産業上の利用分野】 本発明は、半導体ウエハ、フォトマスク用のガラス基板、液晶表示装置用のガラス基板、光ディスク用の基板等の基板にレジスト液などの塗布液を塗布したり、また、基板の外周縁に溶剤を供給して洗浄する、いわゆるエッジリンスを行うなどのために、基板の外周縁を保持する基板保持部材と、その基板保持部材を鉛直方向の軸芯周りで回転する基板回転手段と、基板の裏面に接触して基板を基板保持部材に保持する保持位置とそれより上方の受け渡し位置とに昇降する基板昇降ピンとを備えた回転式基板処理装置に関する。

【0002】

【従来の技術】 この種の回転式基板処理装置としては、従来一般に、基板を真空吸着によって保持するように構成されている。ところが、その強い吸着力に起因して基板裏面にチャック跡が残り、このチャック跡が前工程からの汚染に加わり、基板表面の高さにズレを生じて、露光時のフォーカス異常を発生させる問題があった。また、基板の裏面に付着したパーティクルが離脱し、カセットに收容する場合に、下側に收容されている基板の表面を汚染するとか、あるいは、基板搬送装置に転移して

他の基板を汚染するといった問題があった。

【0003】 そこで、上述のような問題を回避するために、基板の外周縁側に、基板の裏面を支持する支持ピンと、基板の端面と当接して水平方向の位置を規制する規制ピンとを設けるとか、あるいは、基板の外周縁をその全周にわたって覆いながら支持する環状部材を設けるなど、基板をその外周縁側でのみ支持するように構成したものが提案されている。

【0004】 また、提案例の場合、基板の回転に伴って基板の裏面側で気流が発生し、その気流が基板の外周縁を支持する部材と干渉するとともに基板の外周部にまで乱流を引き起こす問題があり、通常、基板の裏面に対向するようにプレートなどを設け、そのプレートなどに、支持ピンや規制ピン、あるいは、環状部材を設け、基板との間に密閉状の空間が形成されるように構成されている。

【0005】

【発明が解決しようとする課題】 しかしながら、基板をその外周縁側でのみ支持する構成の場合、基板を搬入・搬出するために基板を昇降する基板昇降ピンが必要である。そのため、プレートなどに、基板昇降ピンを出退する貫通穴を貫通形成し、所定位置に停止した状態で、貫通穴を通して基板昇降ピンを昇降させ、基板を昇降できるようにしている。ところが、基板が回転して、密閉状の空間内の空気が基板の外周縁側に流れるに伴い、その密閉状の空間内が負圧になり、貫通穴を通じて外部の空気が流入し、この流入空気が清浄で無い場合に、基板の裏面にミストが付着して基板の裏面や端面を汚す欠点があった。

【0006】 本発明は、このような事情に鑑みてなされたものであって、基板裏面にチャック跡を生じさせないものでありながら、基板の搬入・搬出のために基板を昇降する構成に起因する基板の裏面や端面の汚れ発生を回避できるようにすることを目的とする。

【0007】

【課題を解決するための手段】 請求項 1 に係る発明は、上述のような目的を達成するために、基板の外周縁を保持する基板保持部材と、その基板保持部材を鉛直方向の軸芯周りで回転する基板回転手段と、基板の裏面に接触して基板を基板保持部材に保持する保持位置とそれより上方の受け渡し位置とに昇降する基板昇降ピンとを備えた回転式基板処理装置において、基板保持部材を、基板を保持した状態で基板との間に密閉状の空間を形成するように構成するとともに、基板保持部材に基板昇降ピンを昇降出退する貫通穴を形成し、基板昇降ピンを上昇するときには貫通穴を開き、かつ、下降引退させた状態では貫通穴を閉塞する蓋部材を設けて構成する。

【0008】 また、請求項 2 に係る発明は、上述のような目的を達成するために、基板の外周縁を保持する基板保持部材と、その基板保持部材を鉛直方向の軸芯周りで

回転する基板回転手段と、基板の裏面に接触して基板を基板保持部材に保持する保持位置とそれより上方の受け渡し位置とに昇降する基板昇降ピンとを備えた回転式基板処理装置において、基板保持部材を、基板を保持した状態で基板との間に密閉状の空間を形成するように構成するとともに、基板保持部材に基板昇降ピンを密閉状の空間に連なる密閉状態で昇降可能に設け、基板昇降ピンに当接して上昇させる押圧部材を設けるとともに、押圧部材の非当接状態で基板昇降ピンを下降させる付勢機構を設けて構成する。

【0009】

【作用】請求項1に係る発明の回転式基板処理装置の構成によれば、基板を保持して回転するときには、蓋部材によって貫通穴を閉塞し、貫通穴を通じて密閉状の空間内に空気が流入することが無い。一方、回転を停止した状態で基板を搬入・搬出するときには、貫通穴を開き、その貫通穴を通じて基板昇降ピンを昇降して基板を昇降することができる。

【0010】また、請求項2に係る発明の回転式基板処理装置の構成によれば、基板を保持して回転するときには、押圧部材とは無関係に付勢機構により基板昇降ピンを下降させた状態で密閉状の空間を維持し、密閉状の空間内に空気が流入することが無い。一方、回転を停止した状態で基板を搬入・搬出するときには、押圧部材を昇降することにより、基板昇降ピンに押圧部材を当接し、付勢機構との協働により基板昇降ピンを昇降して基板を昇降することができる。

【0011】

【実施例】次に、本発明の実施例を図面を用いて詳細に説明する。図1は本発明の回転式基板処理装置の第1実施例を示す全体概略縦断面図、図2は要部の平面図、図3は要部の斜視図であり、電動サーボモータ1に回転軸2を連結し、電動サーボモータ1の駆動によって鉛直方向の軸芯周りで回転軸2を回転するように基板回転手段3が構成され、回転軸2の上端側に、基板Wの外周縁を載置して保持する基板保持部材4が一体回転可能に取り付けられている。

【0012】基板保持手段4およびそれによって水平姿勢に保持された基板Wの周囲は、昇降駆動機構（図示せず）によって昇降可能な下側の第1のカップ5と、それより上側の第2のカップ6とで覆われている。

【0013】第2のカップ6の外側には、基板W上の回転中心に相当する供給位置と基板W上から外れた待機位置にわたって移動可能に構成されたレジスト液供給ノズル7が設けられ、供給位置において基板Wの表面にレジスト液を供給し、基板Wの回転により基板Wの表面にレジスト液を塗布できるように構成されている。また、第2のカップ6の外側には、基板Wの外周縁上に相当する供給位置と基板W上から外れた待機位置にわたって移動可能に構成された溶剤供給ノズル8が設けられ、供給位

置において基板Wの表面の外周縁に溶剤を供給し、基板外周縁のレジスト液を除去できるように構成されている。

【0014】回転軸2に一体回転可能に連結される底板9に、スペーサ（図示せず）を介して排水用の隙間（例えば、約0.2mm）が形成されるように環状の支持材10が取り付けられている。また、支持材10の上面には、その周方向に所定間隔を隔てて3本のピン状支持部材11…が設けられ、基板Wの裏面に点接触して基板Wを支持するように構成され（図5参照）、基板Wを保持した状態で基板Wとの間に密閉状の空間Sが形成されるように基板保持部材4が構成されている。

【0015】また、支持材10の上面のピン状支持部材11…よりも外側には、その周方向に所定間隔を隔てて6本のピン状の規制部材12…が設けられ、ピン状支持部材11…による支持状態の基板Wの外周端縁に点接触して基板Wの水平方向の位置を規制するように構成されている。規制部材12…のうちの所定の2本は、基板Wのオリエンテーションフラットの外周端縁に点接触して基板Wに回転力を有効に伝達できるように設けられている。規制部材12としては、ピン状に限らず、基板Wの外周端縁に点接触できるように構成するものであれば良く、棒状でも板状でも良い（図5参照）。

【0016】前記規制部材12…の水平方向外側において、基板Wの外周縁を全周にわたって覆うように環状部材13が設けられ、かつ、基板Wの外周縁ならびに規制部材12…と環状部材13の内周面との間、および、支持材10の外周面と環状部材13の内周面との間に、基板Wから遠心力によって流されるドレンを鉛直方向下方に向かわせるドレン流路14が形成されている（図5参照）。

【0017】環状部材13の上面は平坦な水平面に構成され、また、環状部材13の下部はスペーサ（図示せず）を介してドレン排出用の隙間が形成されるように底板9に取り付けられ、ドレン流路14を通じて流されるレジスト液や溶剤を外部に排出できるように構成されている。また、ドレン流路14により、遠心力により基板Wの外周縁と環状部材13の内周面との間側に向かう気流を環状部材13の内周面で受け止め、その流れに抵抗を与え、気流のほとんどを乱れの無い状態で環状部材13の平坦な上面に沿って流し、ピン状支持部材11…や規制部材12…によって乱流が生じることを防止できるように構成されている。

【0018】回転軸2が筒状に構成され、その回転軸2内から底板8を貫通する状態で洗浄液供給ノズル15が設けられ、基板Wの裏面に洗浄液を供給し、排水用の隙間からドレン排出用の隙間を通じて外部に排出し、基板Wの裏面を洗浄できるように構成されている。

【0019】底板9の所定の3箇所に貫通穴16が形成され、かつ、底板9の下方に、3本の基板昇降ピン17

…が昇降可能に設けられ、ロータリー・エンコーダなどによりパルスをカウントするとともに電動サーボモータ 1 の微動により基板保持部材 4 を所定位置で停止させ、その状態で基板昇降ピン 1 7 …を貫通穴 1 6 を通じて昇降出退させ、基板 W をピン状支持部材 1 1 …に支持させる保持位置とそれより上方の受け渡し位置とに昇降するように構成されている。

【0020】図 4 の要部の拡大断面図に示すように、貫通穴 1 6 内に、一対の板バネ 1 8 a, 1 8 a による蓋部材 1 8 が設けられ、自然状態では板バネ 1 8 a, 1 8 a 10 それぞれの弾性復元力により端面どうしが圧接して貫通穴 1 6 を閉塞し、一方、その弾性復元力に抗して互いに離間する側に押圧することにより貫通穴 1 6 を開くように構成されている。

【0021】両板バネ 1 8 a, 1 8 a それぞれの下端側が、貫通穴 1 6 内に形成した係止溝 1 9 内に嵌入係止されるとともに、板バネ 1 8 a, 1 8 a の互いに対向する内周面側が、基板昇降ピン 1 7 の先端側の肩部 1 7 a にのみ当接するように突出されてカム部 1 8 b に構成され、一方、基板昇降ピン 1 7 の先端部 1 7 b が、肩部 1 7 a がカム部 1 8 b に当接した状態で板バネ 1 8 a, 1 8 a の内周面に接触しないように突出されている。 20

【0022】以上の構成により、レジスト液の塗布やエッジリンスや裏面洗浄を行うために、基板昇降ピン 1 7 を下降引退させて基板 W を基板保持部材 4 に保持して回転するときには、図 4 の (a) に示すように、蓋部材 1 8 により貫通穴 1 6 を閉塞し、密閉状の空間 S 内に貫通穴 1 6 …から空気が流入することを回避できる。一方、基板 W の搬入・搬出のために基板昇降ピン 1 7 …を昇降するときには、基板保持部材 4 の回転を所定位置で停止させ、基板昇降ピン 1 7 を上昇させることにより、肩部 1 7 a をカム部 1 8 b に当接し、先端部 1 7 b を板バネ 1 8 a, 1 8 a の内周面に接触させること無く板バネ 1 8 a, 1 8 a を離間させて貫通穴 1 6 …を開くことができる。このように、基板 W の裏面と接触する先端部 1 7 b を板バネ 1 8 a, 1 8 a の内周面に接触させないから、基板 W の裏面の汚染を防止する上で有利である。 30

【0023】次に、上記実施例装置と比較用装置との比較実験結果について説明する。比較用装置としては、底板 9 に蓋部材 1 8 を設けていない構成のものをを用いた。 40
なお、貫通穴 1 6 の大きさは、直径 3 mm であった。両装置それぞれにおいて、直径 6 インチの基板 W にポジレジスト液を 1.2 μ m の厚さに塗布したところ、比較用装置では、基板 W の外周縁での気流の乱れが大きくなり、また、基板 W の外周縁での膜厚プロファイルの乱れは基板 W の外周端から 2 ~ 5 mm の範囲にまで及び、また、底板 9 の下方にレジスト液のミストが混入した場合には、貫通穴 1 6 からミストが侵入し、基板 W の裏面に、大きさが 0.2 μ m 以上のミストが約 100 個付着した。これに対して、上記実施例装置の場合、基板 W の外周縁での膜厚 50

プロファイルの乱れは基板 W の外周端から 2 mm 以内に収まり、また、基板 W の裏面へのミストの付着は無く、蓋部材 1 8 を設けることによって処理品質を大幅に向上できることが明らかであった。

【0024】図 5 は、本発明の回転式基板処理装置の第 2 実施例を示す一部省略全体概略縦断面図であり、第 1 実施例と異なるところは次の通りである。すなわち、底板 9 の下向き面にエアシリンダ 2 0 が取り付けられるとともに、水平方向に変位して貫通穴 1 6 を開閉可能に蓋部材 2 1 が設けられ、エアシリンダ 2 0 と蓋部材 2 1 とが連結され、かつ、エアシリンダ 2 0 に第 1 のエア配管 2 2 が接続されるとともに、その第 1 のエア配管 2 2 と、加圧空気源 (図示せず) に接続された第 2 のエア配管 2 3 とが、底板 9 の回転軸 2 との連結用筒部 9 a の肉厚内に形成した第 1 の空気流路 2 4 a、回転軸 2 の肉厚内に形成した第 2 の空気流路 2 4 b、および、固定部材 2 5 に取り付けられた円筒体 2 6 に形成した環状空気流路 2 4 c を介して接続されている。他の構成は第 1 実施例と同じであり、同一図番を付してその説明は省略する。 20

【0025】この第 2 実施例において、エアシリンダ 2 0 と真空吸引源とを接続し、真空吸引圧を用いて蓋部材 2 1 を開閉するように構成しても良い。

【0026】図 6 は、本発明の回転式基板処理装置の第 3 実施例を示す一部省略全体概略縦断面図であり、第 1 実施例と異なるところは次の通りである。すなわち、底板 9 の下向き面に下方に延びる筒体 2 7 が取り付けられ、その筒体 2 7 内に、密閉状の空間 S に連なる密閉状態で昇降可能に基板 W の裏面に点接触する基板昇降ピン 2 8 が設けられるとともに、基板昇降ピン 2 8 を下降側に変位するように付勢する圧縮コイルスプリング 2 9 が設けられている。筒体 2 7 の下部に開口 3 0 が形成され、その開口 3 0 の下方に対応させて、基板昇降ピン 2 8 に当接して上昇させる押圧部材 3 1 が昇降可能に設けられている。他の構成は第 1 実施例と同じであり、同一図番を付してその説明は省略する。 30

【0027】上記構成により、基板 W の搬入時には、所定位置で停止された基板保持部材 4 に対して押圧部材 3 1 を上昇させ、基板昇降ピン 2 8 に当接してそれを基板 W の受け渡し位置まで上昇させる。そして、基板 W の受け渡し後には、押圧部材 3 1 を筒体 2 7 外まで下降させて、基板昇降ピン 2 8 に対して非当接状態にし、圧縮コイルスプリング 2 9 の弾性復元力により基板昇降ピン 2 8 を下降させ、基板 W を保持位置に下降してピン状支持部材 1 1 上に支持させる。この状態で、基板 W を回転してレジスト液の塗布やエッジリンスや裏面洗浄処理を行う。このとき、基板昇降ピン 2 8 と筒体 2 7 との間で密閉状態に維持され、基板昇降ピン 2 8 の昇降構成に起因して下部から空気を流入させることが無く、基板 W の裏面の汚染を発生しない。次いで、基板 W を搬出するとき 50

には、基板保持部材 4 の回転を所定位置で停止させ、基板保持部材 4 に対して押圧部材 3 1 を上昇させ、基板昇降ピン 2 8 に当接してそれに支持された基板 W を受け渡し位置まで上昇させて搬出する。

【0028】この第 3 実施例において、基板昇降ピン 2 8 を下降側に変位するように付勢するのに、上述のような圧縮コイルスプリング 2 9 に代え、例えば、引っ張りスプリングを用いるとか、更に、基板昇降ピン 2 8 そのものを重量物で構成するとか、あるいは、基板昇降ピン 2 8 に重量物を付設するなど、重力を利用しても良く、要するに、基板昇降ピン 2 8 を保持位置側に変位するように付勢するための、圧縮コイルスプリング 2 9、引っ張りスプリング、重力を利用する構成などをして付勢機構と総称する。

【0029】図 7 は、本発明の回転式基板処理装置の第 4 実施例を示す要部の断面図、図 8 は底面図であり、第 1 実施例と異なるところは次の通りである。すなわち、貫通穴 1 6 を開閉する蓋部材 1 8 が可撓性材料による鉢状の部材で構成され、この蓋部材 1 8 の貫通穴 1 6 より離れる長手方向一端側が底板 9 の下向き面にビス 3 2 で取り付けられている。蓋部材 1 8 には、ビス 3 2 側とは反対の長手方向一端側から長い切り込み 3 3 が形成され、切り込み 3 3 の両側の分割片 3 4、3 4 が接触して貫通穴 1 6 を閉塞する状態と、撓み変形により互いに離間して貫通穴 1 6 を開く状態とが得られるように構成されている。また、両分割片 3 4、3 4 それぞれの閉じ状態で貫通穴 1 6 と重複する部分に、切り込み 3 3 から連なる傾斜カム面 F、F が形成されている。他の構成は第 1 実施例と同じである。

【0030】上記構成により、自然状態では、図 7 の (a) に示すように、貫通穴 1 6 を閉塞して、前述した密閉状の空間 S 内への空気の流入を回避できながら、基板 W の搬入・搬出の際には、図 7 の (b) に示すように、基板昇降ピン 1 7 を上昇させるに伴い、その肩部 1 7 a のみを傾斜カム面 F、F に当接させ、両分割片 3 4、3 4 を離間して貫通穴 1 6 を開き、先端部 1 7 b を蓋部材 1 8 と接触させること無く基板昇降ピン 1 7 を昇降して基板 W を保持位置と受け渡し位置とに変位させることができるようになっている。

【0031】図 9 の (a) は、本発明の回転式基板処理装置の第 5 実施例を示す要部の断面図、図 9 の (b) は底面図であり、第 4 実施例と異なるところは次の通りである。すなわち、蓋部材 1 8 が鉛直方向の軸芯周りで回転可能に底板 9 の下向き面に取り付けられ、その蓋部材 1 8 を、貫通穴 1 6 を閉塞する側に変位させるように付勢する巻きバネ 3 5 が付設されるとともに、蓋部材 1 8 に当接して貫通穴 1 6 を閉塞する位置に維持するストッパー 3 6 が設けられている。また、蓋部材 1 8 の閉じ状態で貫通穴 1 6 と重複する部分に、基板昇降ピン 1 7 の肩部 1 7 a のみを当接する傾斜カム面 F 1 が形成され、

基板昇降ピン 1 7 の昇降によって蓋部材 1 8 を開閉し、基板 W を保持位置と受け渡し位置とに変位させることができるようになっている。

【0032】図 10 の (a) は、本発明の回転式基板処理装置の第 6 実施例を示す要部の底面図、図 10 の

(b) および (c) は断面図であり、第 2 実施例と異なるところは次の通りである。すなわち、蓋部材 1 8 が底板 9 の下向き面に、一对のガイド 3 7、3 7 により底板 9 の半径方向に摺動移動可能に設けられるとともに、ガイド 3 7、3 7 よりも回転軸芯側に取り付けられた取付部材 3 8 と蓋部材 1 8 とが引っ張りスプリング 3 9 を介して連結されている。引っ張りスプリング 3 9 としては、その弾性復元力を、基板保持部材 4 の回転を停止して遠心力が働かない自然状態では、貫通穴 1 6 を開く位置まで蓋部材 1 8 を変位させるに足り、かつ、基板保持部材 4 を 800rpm 以上の回転数で回転させたときに、その遠心力により、弾性復元力に抗して貫通穴 1 6 を閉じる位置まで蓋部材 1 8 を変位させることができるように設定されている。図中 4 0 は、蓋部材 1 8 の変位を閉塞位置で止めるストッパーを示している。

【0033】この第 6 実施例によれば、基板保持部材 4 の回転に伴う遠心力を利用して蓋部材 1 8 を開き位置から閉塞位置に変位でき、一方、回転停止に伴い、引っ張りスプリング 3 9 の弾性復元力によって蓋部材 1 8 を閉塞位置から開き位置に変位できるから、第 2 実施例におけるようなエアシリンダ 2 0 やそれに対する駆動源が不用になり、簡単かつ安価に構成できる利点を有している。

【0034】本発明としては、上述実施例のようなオリエンテーションフラットを有する円形基板に限らず、ノッチを有する円形基板や液晶用などの角型基板に対する回転式基板処理装置にも適用できる。

【0035】

【発明の効果】以上の説明から明らかなように、請求項 1 に係る発明の回転式基板処理装置によれば、基板保持部材の回転を停止した状態では、貫通穴を通じて基板昇降ピンを昇降して基板を昇降し、基板を搬入・搬出できながら、基板を保持して回転するときには、蓋部材によって貫通穴を閉塞し、貫通穴を通じて密閉状の空間内に空気を流入させることが無いから、基板の回転に伴い、貫通穴を通じてミストが流入し、基板の裏面に付着することを回避でき、基板裏面にチャック跡を生じさせないものでありながら、基板の搬入・搬出のために基板を昇降する構成に起因する基板の裏面や端面の汚れ発生を回避できるようになった。

【0036】また、請求項 2 に係る発明の回転式基板処理装置によれば、基板保持部材の回転を停止した状態では、基板昇降ピンに押圧部材を当接させ、基板昇降ピンを昇降して基板を昇降し、基板を搬入・搬出できながら、基板を保持して回転するときには、付勢機構により

基板昇降ピンを下降させた状態で密閉状の空間を維持し、密閉状の空間内に空気を流入させることが無いから、基板の回転に伴い、密閉状の空間内にミストが流入して基板の裏面に付着することを回避でき、基板裏面にチャック跡を生じさせないものでありながら、基板の搬入・搬出のために基板を昇降する構成に起因する基板の裏面や端面の汚れ発生を回避できるようになった。

【図面の簡単な説明】

【図 1】 本発明の回転式基板処理装置の第 1 実施例を示す全体概略縦断面図である。

【図 2】 要部の平面図である。

【図 3】 要部の斜視図である。

【図 4】 要部の拡大断面図である。

【図 5】 本発明の回転式基板処理装置の第 2 実施例を示す一部省略全体概略縦断面図である。

【図 6】 本発明の回転式基板処理装置の第 3 実施例を示す一部省略全体概略縦断面図である。

【図 7】 本発明の回転式基板処理装置の第 4 実施例を示す要部の断面図である。

【図 8】 要部の底面図である。

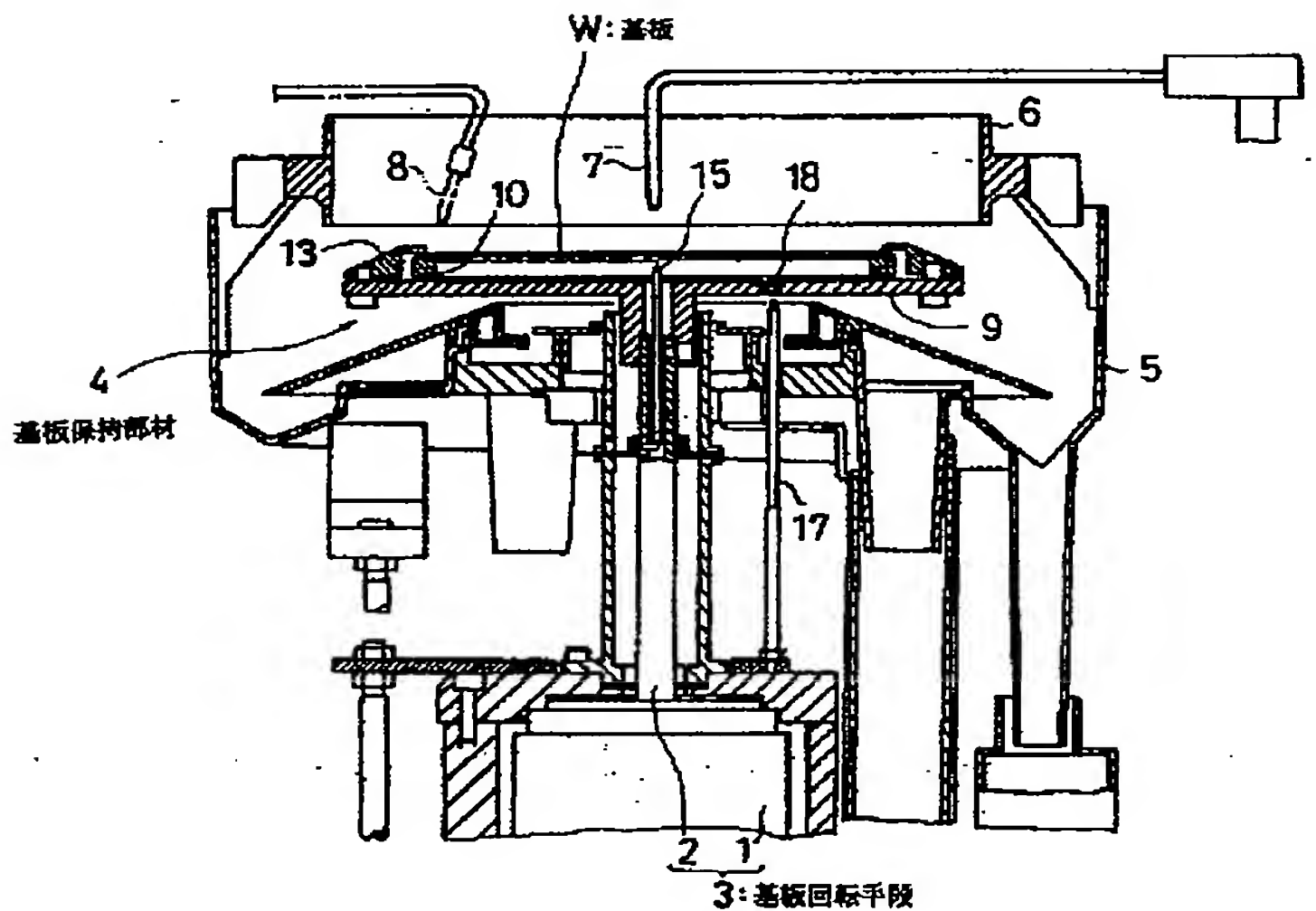
【図 9】 (a) は、本発明の回転式基板処理装置の第 5 実施例を示す要部の断面図、(b) は、要部の底面図である。

【図 10】 (a) は、本発明の回転式基板処理装置の第 6 実施例を示す要部の底面図、(b) および (c) は、要部の断面図である。

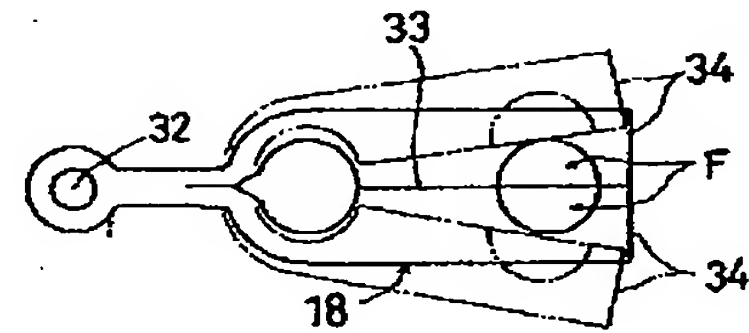
【符号の説明】

- 3…基板回転手段
4…基板保持部材
16…貫通穴
17…基板昇降ピン
18…蓋部材
21…蓋部材
28…基板昇降ピン
29…圧縮コイルスプリング
31…押圧部材
S…密閉状の空間
W…基板

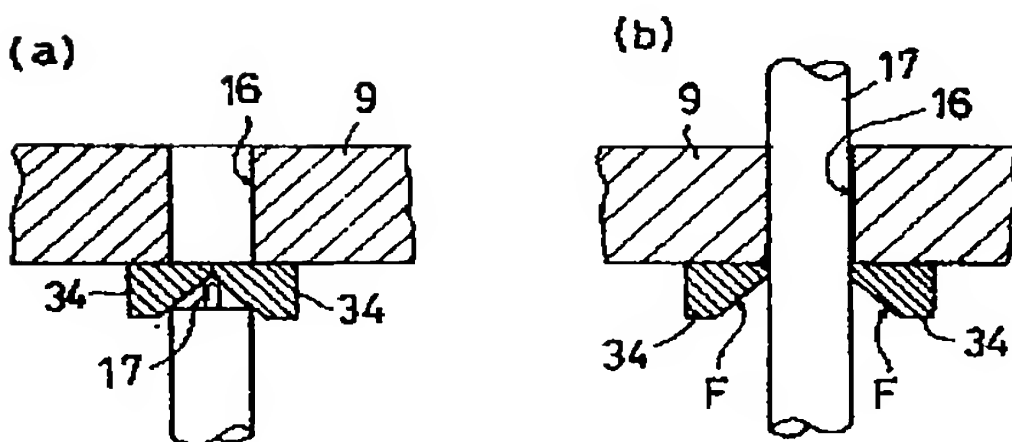
【図 1】



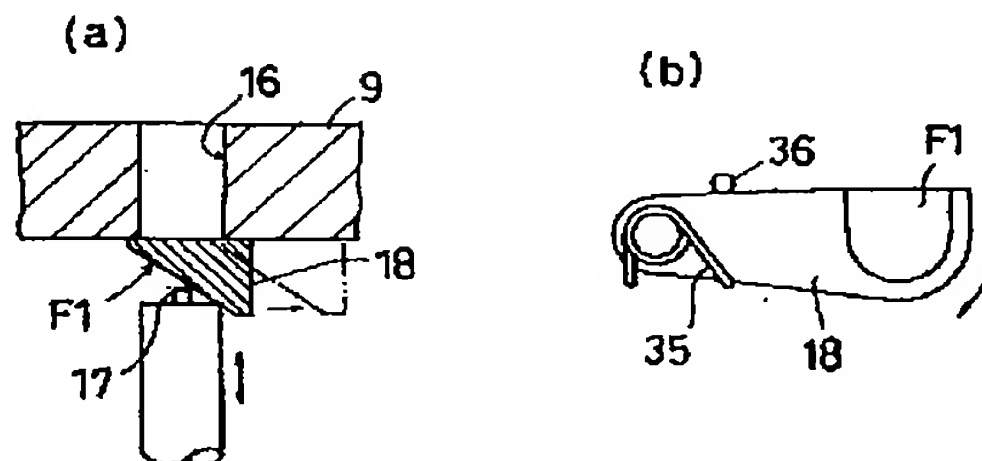
【図 8】



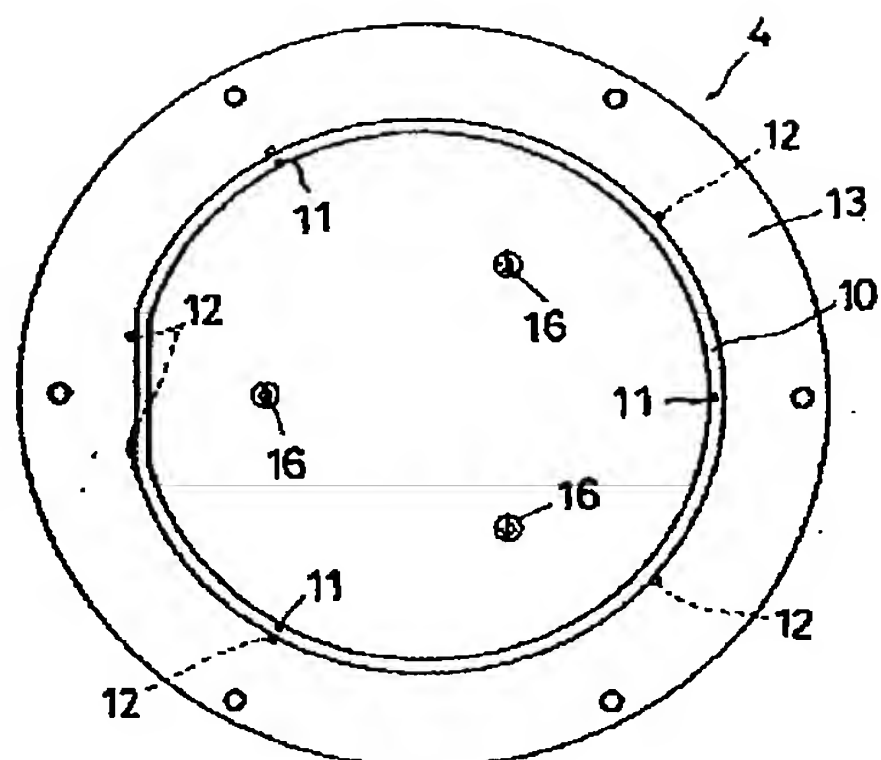
【図 7】



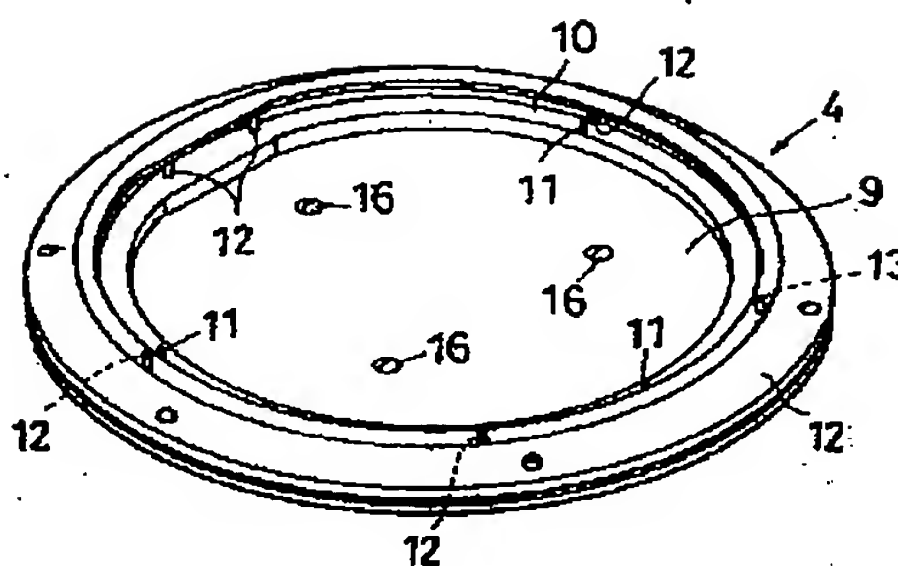
【図 9】



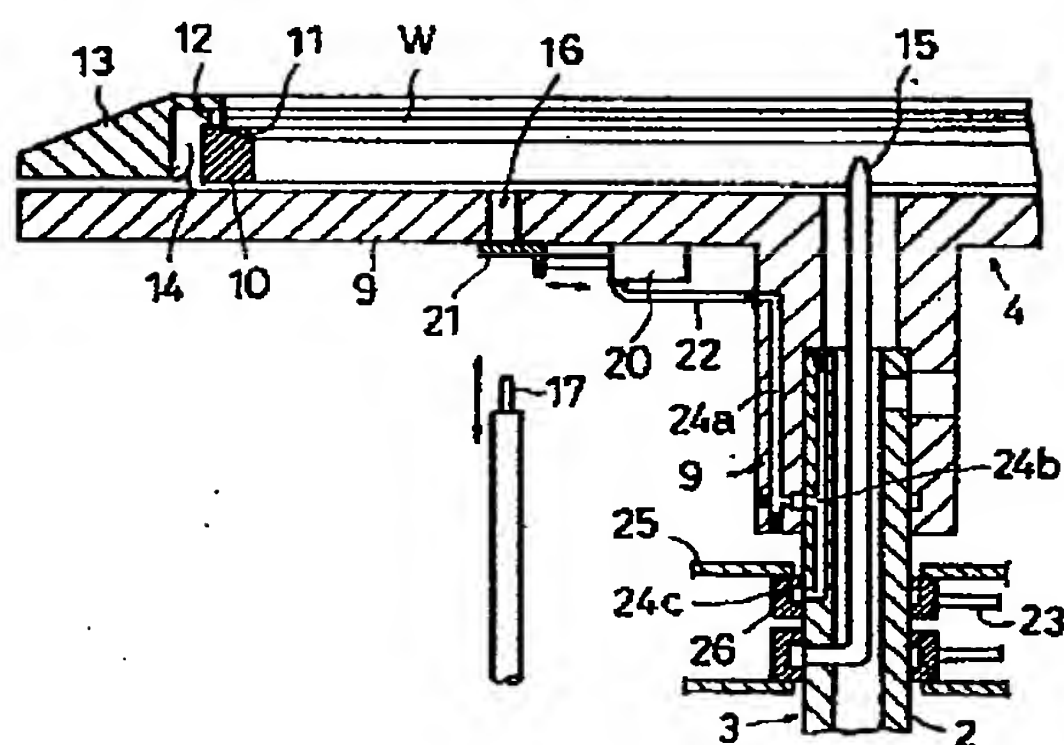
【図 2】



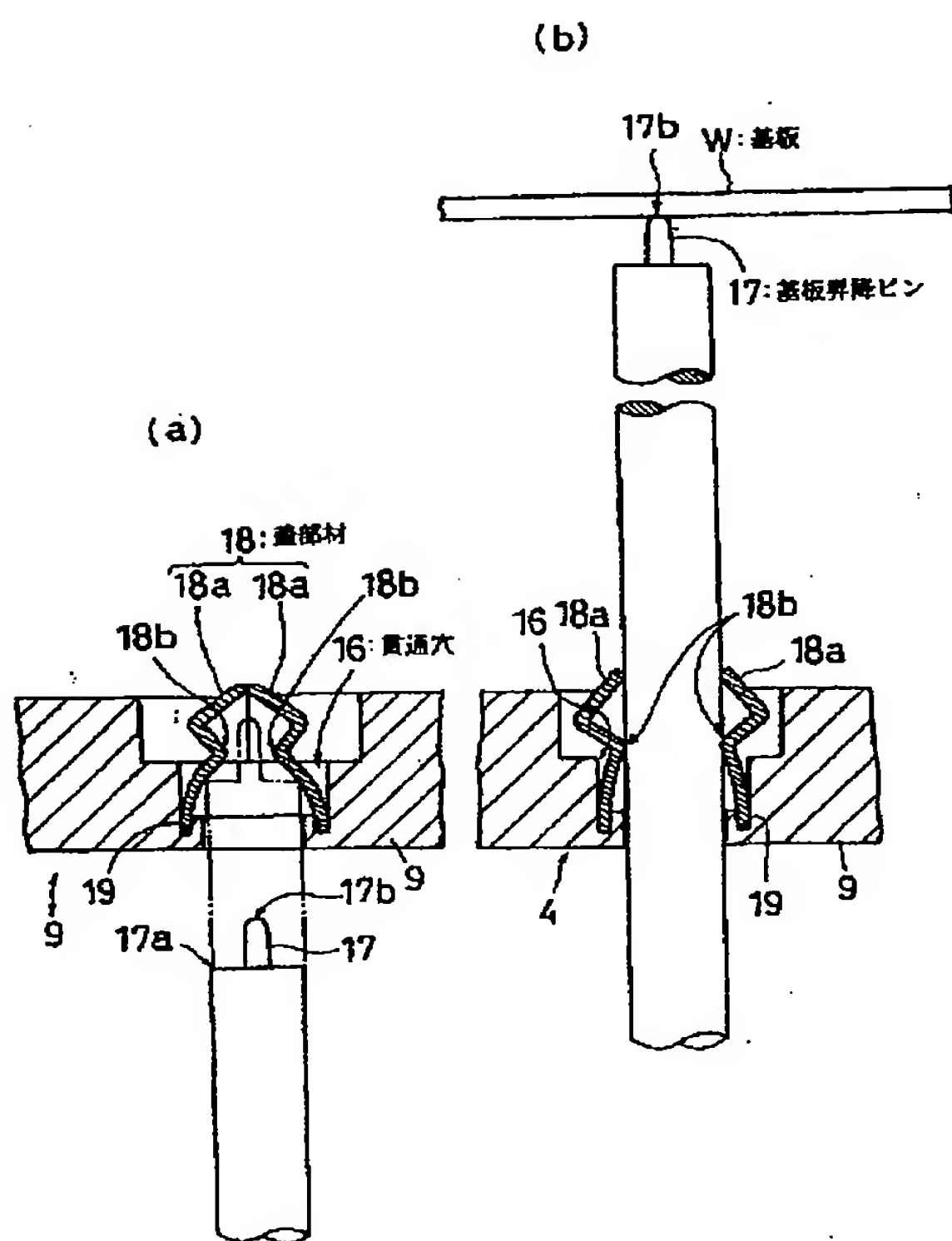
【図 3】



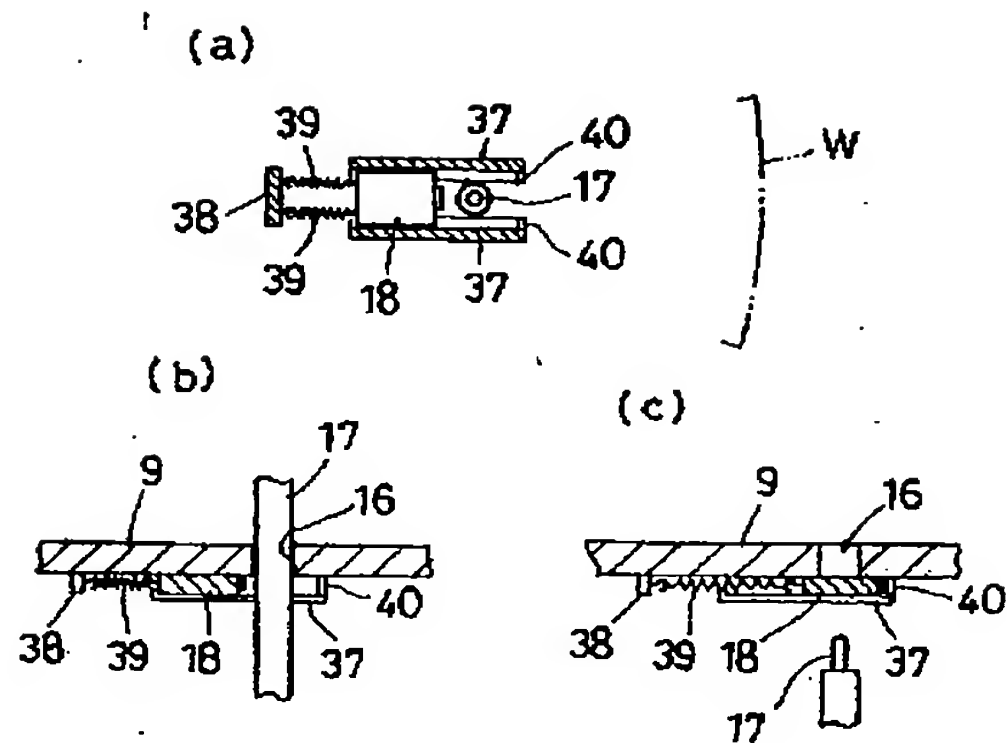
【図5】



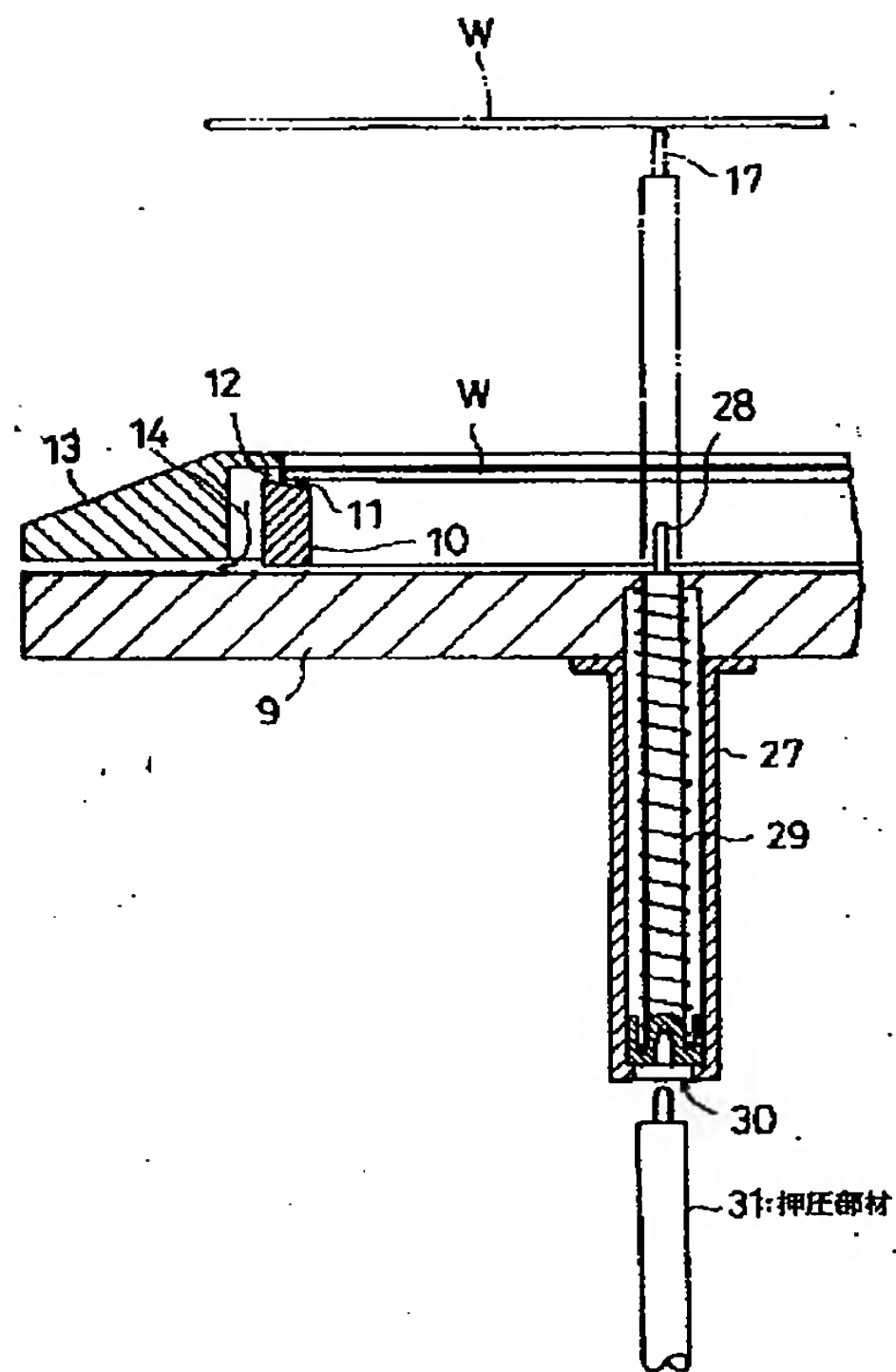
【圖4】



【図 10】



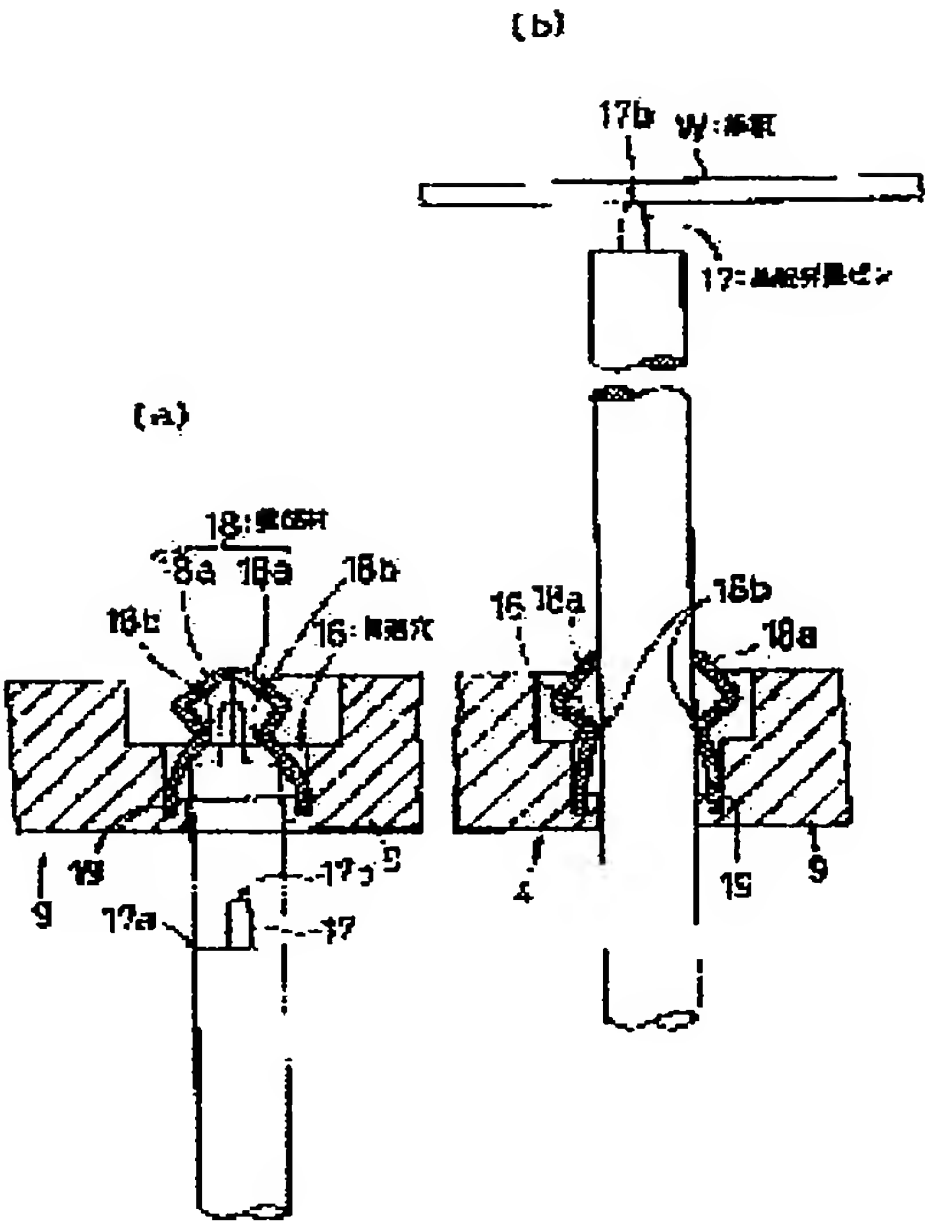
【図6】



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21)Application number : 06-312682 (71)Applicant : DAINIPPON SCREEN MFG CO LTD
22)Date of filing : 21.11.1994 (72)Inventor : YABE MANABU
HISAI AKIHIRO

CONSTITUTION: This treating device is so constituted that the substrate W is made rotatable around the axial center in the perpendicular direction while the outer peripheral edge of the substrate is held by a hinge-shaped supporting member and a regulating member. The device is so constituted that a hermetic space is formed between a base plate 9 provided with the pin-shaped supporting member and the regulating member and the substrate W. A through-hole 16 is formed at the bottom plate 9 and a substrate lifting pin 17 is lifted through this through-hole 16. In addition, the through-hole 16 is provided with a cap member 18. This cap member 18 is so displaced as to open the through-hole 16 at the time of lifting the substrate lifting pin 17 and to close the through-hole 16 in the state of lowering and retreating the substrate lifting pin 17. The cap member is so constituted as to prevent the inflow of the air from the through-hole 16 at the time of rotating the substrate W.



Date of request for examination]	28.11.1997
Date of sending the examiner's decision of rejection]	
Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]	abandonment
Date of final disposal for application]	13.01.2000
Patent number]	
Date of registration]	
Number of appeal against examiner's decision of rejection]	
Date of requesting appeal against examiner's decision	

of rejection]
Date of extinction of right]

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**** shows the word which can not be translated.
In the drawings, any words are not translated.

CLAIMS

Claim(s)]

Claim 1] The substrate attachment component holding the periphery edge of a substrate, and a substrate rotation means to rotate the substrate attachment component by the circumference of the axis of the direction of a vertical, It is the rotating type substrate processor equipped with the substrate rise-and-fall pin which goes up and down in an upper delivery location from the maintenance location and it which contact the rear face of said substrate and hold said substrate to said substrate attachment component. While constituting so that the space of the letter of sealing may be formed between said substrates, where said substrate is held for said substrate attachment component The rotating type substrate processor characterized by preparing the covering device material which blockades said through hole where it opened said through hole when forming in said substrate attachment component the through hole which carries out rise-and-fall **** of said substrate rise-and-fall pin and going up said substrate rise-and-fall pin, and downward retirement is carried out.

Claim 2] The substrate attachment component holding the periphery edge of a substrate, and a substrate rotation means to rotate the substrate attachment component by the circumference of the axis of the direction of a vertical, It is the rotating type substrate processor equipped with the substrate rise-and-fall pin which goes up and down in an upper delivery location from the maintenance location and it which contact the rear face of said substrate and hold said substrate to said substrate attachment component. While constituting so that the space of the letter of sealing may be formed between said substrates, where said substrate is held for said substrate attachment component While preparing said substrate rise-and-fall pin in said substrate attachment component possible [rise and fall] in the sealing condition which stands in a row to the space of said letter of sealing and preparing the press member raised in contact with said substrate rise-and-fall pin The rotating type substrate processor characterized by establishing the energization device in which said substrate rise-and-fall pin is dropped in the state of un-contacting [of said press member].

[translation done.]

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In the drawings, any words are not translated.

ETAILED DESCRIPTION

Detailed Description of the Invention]

0001]

Industrial Application] This invention A semi-conductor wafer, the glass substrate for photo masks, the glass substrate for liquid crystal displays, For applying coating liquid, such as resist liquid, to substrates, such as a substrate for optical disks, and supplying a solvent on the periphery edge of a substrate, and washing, performing the so-called edge rinse, etc. The substrate attachment component holding the periphery edge of a substrate, and a substrate rotation means to rotate the substrate attachment component by the circumference of the axis of the direction of a vertical, It is related with the rotating type substrate processor equipped with the substrate rise-and-fall pin which goes up and down in an upper delivery location from the maintenance location and it which contact the rear face of a substrate and hold a substrate to a substrate attachment component.

0002]

Description of the Prior Art] As this kind of a rotating type substrate processor, conventionally, generally, it is constituted so that a substrate may be held by vacuum adsorption. However, it originated in that strong adsorption power, and the remains of a chuck remained in the substrate rear face, these remains of a chuck caused contamination from the last process, produced gap in the height on the front face of a substrate, and there was a problem which generates the focal abnormalities at the time of exposure. Moreover, when the article adhering to the rear face of a substrate broke away and it held in a cassette, there was a problem of polluting the front face of the substrate held in the bottom, or having transferred to a substrate transport device and polluting other substrates.

0003] Then, what was constituted so that a substrate might be supported only on the periphery veranda is proposed, such as preparing the support pin which supports the rear face of a substrate, and the regulation pin which regulates a horizontal location in contact with the end face of a substrate in the periphery veranda of a substrate, or preparing the annular member supported while covering the periphery edge of a substrate over the perimeter, in order to avoid the above problems.

0004] Moreover, in the case of the example of a proposal, an air current occurs in the rear-face side of a substrate with rotation of a substrate. There is a problem which causes a turbulent flow even in the periphery section of a substrate while the air current interferes with the member which supports the periphery edge of a substrate. Usually, a plate etc. is prepared so that the rear face of a substrate may be countered, and a support pin, a regulation pin, or an annular member is prepared in the plate etc., and it is constituted so that the space of the letter of sealing may be formed between substrates.

0005]

Problem(s) to be Solved by the Invention] However, in a configuration of supporting a substrate only on the periphery veranda, in order to carry in and take out a substrate, the substrate rise-and-fall pin which goes up and down a substrate is required. Therefore, penetration formation of the ***** which comes out of and removes a substrate rise-and-fall pin on a plate etc. is carried out, and you make it go up and down a substrate rise-and-fall pin through a through hole, and it enables it to go up and down a substrate in the condition of having stopped in the predetermined location. However, the substrate rotated, it followed on the air in the space of the letter of sealing flowing on the periphery veranda of a substrate, the inside of the space of that letter of sealing became negative pressure, external air flowed through the through hole, this inflow air was pure, and when there was nothing, there was a fault which dust adheres to the rear face of a substrate and soils the rear face and end face of a substrate.

0006] This invention aims at enabling it to avoid dirt generating of the rear face of a substrate, or an end face

resulting from the configuration which goes up and down a substrate for carrying in and taking out of a substrate, being made in view of such a situation and not making a substrate rear face produce the remains of a huck.

0007]

Means for Solving the Problem] The substrate attachment component which holds the periphery edge of a substrate in order that invention concerning claim 1 may attain the above purposes, A substrate rotation means to rotate the substrate attachment component by the circumference of the axis of the direction of a vertical, In the rotating type substrate processor equipped with the substrate rise-and-fall pin which goes up and down in an upper delivery location from the maintenance location and it which contact the rear face of a substrate and hold a substrate to a substrate attachment component While constituting so that the space of the letter of sealing may be formed between substrates, where a substrate is held for a substrate attachment component the through hole which carries out rise-and-fall **** of the substrate rise-and-fall pin is formed in a substrate attachment component, and where it opened the through hole when going up a substrate rise-and-fall pin, and downward retirement is carried out, the covering device material which blockades a through hole is prepared and constituted.

0008] Moreover, in order that invention concerning claim 2 may attain the above purposes The substrate attachment component holding the periphery edge of a substrate, and a substrate rotation means to rotate the substrate attachment component by the circumference of the axis of the direction of a vertical, In the rotating type substrate processor equipped with the substrate rise-and-fall pin which goes up and down in an upper delivery location from the maintenance location and it which contact the rear face of a substrate and hold a substrate to a substrate attachment component While constituting so that the space of the letter of sealing may be formed between substrates, where a substrate is held for a substrate attachment component While preparing substrate rise-and-fall pin in a substrate attachment component possible [rise and fall] in the sealing condition which stands in a row to the space of the letter of sealing and preparing the press member raised in contact with a substrate rise-and-fall pin, the energization device in which a substrate rise-and-fall pin is dropped in the state of un-contacting [of a press member] is established and constituted.

0009]

Function] According to the configuration of the rotating type substrate processor of invention concerning claim 1, when holding a substrate and rotating, by covering device material, a through hole is blockaded and air does not flow in the space of the letter of sealing through a through hole. On the other hand, where rotation is suspended, when carrying in and taking out a substrate, a through hole can be opened, and it can go up and down a substrate rise-and-fall pin through the through hole, and can go up and down a substrate.

0010] Moreover, according to the configuration of the rotating type substrate processor of invention concerning claim 2, when holding a substrate and rotating, where a substrate rise-and-fall pin is dropped according to an energization device regardless of a press member, the space of the letter of sealing is maintained, and air does not flow in the space of the letter of sealing. On the other hand, where rotation is suspended, when carrying in and taking out a substrate, by going up and down a press member, a substrate rise-and-fall pin can be contacted in a press member, and it can go up and down a substrate rise-and-fall pin by collaboration with an energization device, and can go up and down a substrate.

0011]

Example] Next, the example of this invention is explained to a detail using a drawing. The substrate rotation means 3 is constituted so that the top view of an important section and drawing 3 may be the perspective views of an important section, and whole outline drawing of longitudinal section in which drawing 1 shows the 1st example of the rotating type substrate processor of this invention, and drawing 2 may connect a revolving shaft 1 with the electric servo motor 1 and may rotate a revolving shaft 2 by the circumference of the axis of the direction of a vertical by the drive of the electric servo motor 1, and the substrate attachment component 4 which lays and holds the periphery edge of Substrate W to the upper limit side of a revolving shaft 2 is really attached pivotable.

0012] The perimeter of the substrate W held by the substrate maintenance means 4 and it at the horizontal position is covered from the 1st cup 5 of the bottom which can go up and down with a rise-and-fall drive (not shown), and the 2nd cup 6 above it.

0013] The resist liquid supply nozzle 7 constituted movable covering the supply location equivalent to the center of rotation on Substrate W and the position in readiness from which it separated from Substrate W is formed in the outside of the 2nd cup 6, and resist liquid is supplied to the front face of Substrate W in a supply

ocation, and it is constituted so that resist liquid can be applied to the front face of Substrate W by rotation of substrate W. Moreover, the solvent supply nozzle 8 constituted movable covering the supply location which corresponds on the periphery edge of Substrate W, and the position in readiness from which it separated from substrate W is formed in the outside of the 2nd cup 6, and a solvent is supplied to the periphery edge of the front face of Substrate W in a supply location, and it is constituted so that the resist liquid of a substrate periphery edge can be removed.

0014] The annular supporting material 10 is attached so that the clearance for wastewater (for example, about 2mm) may be formed in the bottom plate 9 really connected with a revolving shaft 2 pivotable through a spacer (not shown). Moreover, predetermined spacing is separated to the hoop direction, and three pin-like supporter material 11 — is prepared in the top face of supporting material 10, it is constituted so that point contact may be carried out to the rear face of Substrate W and Substrate W may be supported (refer to drawing 5), and the substrate attachment component 4 is constituted so that the space S of the letter of sealing may be formed between Substrates W, where Substrate W is held.

0015] Moreover, rather than pin-like supporter material 11 — of the top face of supporting material 10, predetermined spacing is separated to the hoop direction, and, outside, six pin-like specification-part material 12 — is prepared, and it is constituted so that point contact may be carried out to the periphery edge of the substrate W of the support condition by pin-like supporter material 11 — and the horizontal location of substrate W may be regulated. Two of specification-part material 12 — predetermined are prepared so that point contact may be carried out to the periphery edge of the orientation flat of Substrate W and turning effort can be effectively transmitted to Substrate W. It may be cylindrical or tabular is [that what is necessary is just that is constituted as specification-part material 12 so that point contact can be carried out to the periphery edge of not only the shape of a pin but the substrate W] sufficient (refer to drawing 5).

0016] Said specification-part material 12 — On a horizontal outside, the annular member 13 is formed so that the periphery edge of Substrate W may be covered over the perimeter. And the periphery edge of Substrate W and specification-part material 12 —, and the drain passage 14 that makes the drain poured according to a centrifugal force from Substrate W between the inner skin of the annular member 13 and between the peripheral face of supporting material 10 and the inner skin of the annular member 13 go to the direction lower part of a vertical are formed (refer to drawing 5).

0017] The top face of the annular member 13 is constituted by the flat horizontal plane, and the lower part of the annular member 13 is attached in a bottom plate 9 so that the clearance for drain discharge may be formed through a spacer (not shown), and it is constituted so that resist liquid and the solvent which are poured through the drain passage 14 can be discharged outside. Moreover, it responds to the air current which goes to a between [the periphery edge of Substrate W, and the inner skin of the annular member 13] side according to a centrifugal force by the inner skin of the annular member 13 by the drain passage 14, and resistance is given to the flow, and it is constituted so that it can prevent sink and pin-like supporter material 11 — and that a turbulent flow arises by specification-part material 12 — along the flat top face of the annular member 13 in the condition that there is no turbulence of most air currents.

0018] A revolving shaft 2 is constituted by tubed, the penetrant remover supply nozzle 15 is formed in the condition of penetrating a bottom plate 8 from the inside of the revolving shaft 2, a penetrant remover is supplied to the rear face of Substrate W, and it discharges outside through the clearance for drain discharge from the clearance for wastewater, and it is constituted so that the rear face of Substrate W can be washed.

0019] A through hole 16 is formed in three predetermined places of a bottom plate 9. A bottom plate 9 caudad While three substrate rise-and-fall pin 17 — is prepared possible [rise and fall] and counts a pulse by a rotary encoder etc., the substrate attachment component 4 is stopped by jogging of the electric servo motor 1 in a predetermined location. Rise-and-fall **** of substrate rise-and-fall pin 17 — is carried out through a through hole 16 in the condition, and it consists of the maintenance locations and them which make pin-like supporter material 11 — support Substrate W so that it may go up and down in an upper delivery location.

0020] as shown in the expanded sectional view of the important section of drawing 4 , the covering device material 18 by the flat springs 18a and 18a of a pair prepares in a through hole 16 — having — a natural condition — flat springs 18a and 18a — end faces carry out a pressure welding according to each elastic stability, and a through hole 16 is blockaded, and by pressing to the side which resists the elastic stability and is estranged mutually on the other hand, it is constituted so that a through hole 16 may be opened.

0021] While an insertion stop is carried out into the both flat-springs 18a and 18a stop slot 19 formed in the through hole 16, each lower limit side The inner skin side which counters mutually [flat springs 18a and 18a] is

rejected so that only shoulder 17a by the side of the tip of the substrate rise-and-fall pin 17 may be contacted, and it is constituted by cam section 18b. On the other hand, point 17b of the substrate rise-and-fall pin 17 is rejected so that the inner skin of flat springs 18a and 18a may not be contacted, after shoulder 17a has contacted cam section 18b.

[0022] It is avoidable that blockade a through hole 16 by the covering device material 18, and air flows from through hole 16 — in the space S of the letter of sealing by the above configuration as it is shown in (a) of drawing 4, when carrying out downward retirement of the substrate rise-and-fall pin 17, holding Substrate W to the substrate attachment component 4 and rotating in order to perform spreading and edge rinse of resist liquid, and rear-face washing. On the other hand, when going up and down substrate rise-and-fall pin 17 — for carrying in and taking out of Substrate W By stopping rotation of the substrate attachment component 4 in a predetermined location, and raising the substrate rise-and-fall pin 17 Without contacting cam section 18b in shoulder 17a, and contacting point 17b to the inner skin of flat springs 18a and 18a, flat springs 18a and 18a can be made to be able to estrange, and through hole 16 — can be opened. Thus, since point 17b in contact with the rear face of Substrate W is not contacted to the inner skin of flat springs 18a and 18a, it is advantageous when preventing contamination of the rear face of Substrate W.

[0023] Next, the comparative-experiments result of the above-mentioned example equipment and the equipment for a comparison is explained. As equipment for a comparison, the thing of a configuration of having not formed the covering device material 18 was used for the bottom plate 9. In addition, the magnitude of a through hole 16 was 3mm in diameter. It sets to each of both equipments, and is positive resist liquid to the substrate W with a diameter of 6 inches. When it applies to the thickness of 1.2 micrometers, with the equipment for a comparison turbulence of the air current in the periphery edge of Substrate W becomes large, and the turbulence of the thickness profile in the periphery edge of Substrate W reaches even the range of 2-5mm from the periphery edge of Substrate W. Moreover, when Myst of resist liquid mixes under the bottom plate 9, Myst invades from a through hole 16 and magnitude at the rear face of Substrate W Myst 0.2 micrometers or more is abbreviation. 100 pieces adhered. On the other hand, in the case of the above-mentioned example equipment, it was distinctly settling the turbulence of the thickness profile in the periphery edge of Substrate W in less than 2mm from the periphery edge of Substrate W, and there being no adhesion of Myst to the rear face of Substrate W, and forming the covering device material 18 that processing quality can be improved sharply.

[0024] It is the whole abbreviation outline drawing of longitudinal section a part, and a different place from the 1st example where drawing 5 shows the 2nd example of the rotating type substrate processor of this invention is as follows. Namely, while an air cylinder 20 is attached in the downward field of a bottom plate 9 While displacing horizontally, forming the covering device material 21 possible [closing motion of a through hole 16], and connecting an air cylinder 20 and the covering device material 21 and connecting the 1st Ayr piping 22 to an air cylinder 20 The 1st Ayr piping 22 and the 2nd Ayr piping 23 connected to the pressurization air supply (not shown) It connects through 1st airstream way 24a formed in the thickness of cylinder part 9a for connection with the revolving shaft 2 of a bottom plate 9, 2nd airstream way 24b formed in the thickness of a revolving shaft 2, and annular airstream way 24c formed in the cylinder object 26 attached in the holddown member 25. Other configurations are the same as the 1st example, the same drawing number is attached and the explanation is omitted.

[0025] In this 2nd example, an air cylinder 20 and the source of vacuum suction may be connected, and you may constitute so that the covering device material 21 may be opened and closed using vacuum suction force.

[0026] It is the whole abbreviation outline drawing of longitudinal section a part, and a different place from the 1st example where drawing 6 shows the 3rd example of the rotating type substrate processor of this invention is as follows. That is, the barrel 27 prolonged caudad is attached in the downward field of a bottom plate 9, and in the barrel 27, while the substrate rise-and-fall pin 28 which carries out point contact is formed in the rear face of Substrate W possible [rise and fall] in the sealing condition which stands in a row to the space S of the letter of sealing, the compression coil spring 29 energized so that the substrate rise-and-fall pin 28 may be displaced to a descent side is formed. Opening 30 is formed in the lower part of a barrel 27, it is made to correspond under the opening 30, and the press member 31 raised in contact with the substrate rise-and-fall pin 28 is formed possible [rise and fall]. Other configurations are the same as the 1st example, the same drawing number is attached and the explanation is omitted.

[0027] By the above-mentioned configuration, at the time of carrying in of Substrate W, the press member 31 is raised to the substrate attachment component 4 stopped in the predetermined location, and it is raised to the delivery location of Substrate W in contact with the substrate rise-and-fall pin 28. And the press member 31 is

ropped besides a barrel 27, after delivery of Substrate W, it changes into the condition of not contacting, to the substrate rise-and-fall pin 28, and the substrate rise-and-fall pin 28 is dropped according to the elastic stability of the compression coil spring 29, it descends to a maintenance location and Substrate W is made to support on the pin-like supporter material 11. In this condition, Substrate W is rotated and spreading and edge rinse of resist liquid, and rear-face washing processing are performed. At this time, it is maintained by the sealing condition between the substrate rise-and-fall pin 28 and a barrel 27, originate in the rise-and-fall configuration of the substrate rise-and-fall pin 28, air is not made to flow from the lower part, and contamination of the rear face of Substrate W is not generated. Subsequently, when taking out Substrate W, stop rotation of the substrate attachment component 4 in a predetermined location, and raise the press member 31 to the substrate attachment component 4, and deliver the substrate W supported by it in contact with the substrate rise-and-fall pin 28, and it is made to go up to a location, and takes out.

[028] Although it energizes in this 3rd example so that the substrate rise-and-fall pin 28 may be displaced to a descent side Replace with the above compression coil springs 29, constitute substrate rise-and-fall pin 28 itself from a heavy lift further, using a hauling spring, or Or gravity may be used, such as attaching a heavy lift to the substrate rise-and-fall pin 28, the configuration using the compression coil spring 29 for in short, energizing so that the substrate rise-and-fall pin 28 may be displaced to a maintenance location side, a hauling spring, and gravity etc. is carried out, and it is named an energization device generically.

[029] The sectional view of an important section in which drawing 7 shows the 4th example of the rotating type substrate processor of this invention, and drawing 8 are bottom views, and a different place from the 1st example is as follows. That is, the covering device material 18 which opens and closes a through hole 16 consists of members of the shape of scissors by the flexible material, and the longitudinal direction end side separated from the through hole 16 of this covering device material 18 is attached in the downward field of a bottom plate 9 on the screw 32. The long slitting 33 is formed in the covering device material 18 from a longitudinal direction end side opposite to bis-32 side, and it is constituted so that the condition of the pieces 34 and 34 of division of the both sides of slitting 33 contacting, and blockading a through hole 16, and the condition of estranging mutually according to bending deformation and opening a through hole 16 may be acquired. moreover, the pieces 34 and 34 of a bipartite rate — the inclination-cam-die sides F and F which stand in a row from slitting 33 into each part which overlaps a through hole 16 in the state of closing are formed. Other configurations are the same as the 1st example.

[030] Blockade, and as shown in (a) of drawing 7, while the inflow of the air into the space S of the letter of sealing which mentioned the through hole 16 above is avoidable in the natural condition with the above-mentioned configuration, in the case of carrying in and taking out of Substrate W It is made to follow on the substrate rise-and-fall pin 17 going up, as shown in (b) of drawing 7. Without making only the shoulder 17a contact the inclination-cam-die sides F and F, estranging the pieces 34 and 34 of a bipartite rate, opening a through hole 16, and contacting point 17b to the covering device material 18, it can go up and down the substrate rise-and-fall pin 17, Substrate W can be delivered with a maintenance location, and a location can be made to carry out a variation rate now.

[031] (b) of the sectional view of an important section in which (a) of drawing 9 shows the 5th example of the rotating type substrate processor of this invention, and drawing 9 is a bottom view, and a different place from the 4th example is as follows. That is, the covering device material 18 is attached in the downward field of a bottom plate 9 pivotable by the circumference of the axis of the direction of a vertical, and while the volume spring 35 which energizes the covering device material 18 so that a variation rate may be carried out to the side which blockades a through hole 16 is attached, the stopper 36 which maintains in the location which blockades a through hole 16 in contact with the covering device material 18 is formed. Moreover, the inclination-cam-die side F1 which contacts the part which overlaps a through hole 16 in the state of closing of the covering device material 18 only in shoulder 17a of the substrate rise-and-fall pin 17 is formed, the covering device material 18 can be opened and closed, Substrate W can be delivered with a maintenance location, and a location can be made to carry out a variation rate by rise and fall of the substrate rise-and-fall pin 17 now.

[032] (b) of the bottom view of an important section in which (a) of drawing 10 shows the 6th example of the rotating type substrate processor of this invention, and drawing 10, and (c) are sectional views, and a different place from the 2nd example is as follows. namely, the covering device material 18 — the downward field of a bottom plate 9 — the guides 37 and 37 of a pair — radial [of a bottom plate 9] — sliding — while being prepared movable, rather than guides 37 and 37, the attachment member 38 and the covering device material 18 which were attached in the revolving-shaft heart side pull, and it is connected through the spring 39. As a

auling spring 39, the elastic stability in the natural condition that suspend rotation of the substrate attachment component 4 and a centrifugal force does not work When it is sufficient for carrying out the variation rate of the covering device material 18 to the location which opens a through hole 16 and the substrate attachment component 4 is rotated at the rotational frequency of 800 or more rpm, it is set up so that the variation rate of the covering device material 18 can be carried out to the location which resists elastic stability and closes a through hole 16 according to the centrifugal force. 40 in drawing shows the stopper which stops the variation rate of the covering device material 18 in a lock out location.

0033] Since the covering device material 18 is opened using the centrifugal force accompanying rotation of the substrate attachment component 4, and it can displace in a lock-out location from a location, and the covering device material 18 is opened from a lock-out location and it can displace in a location according to the elastic stability of the hauling spring 39 with a rotation halt on the other hand, the driving source to an air cylinder 20 and it becomes unnecessary, and, according to this 6th example, has the advantage which can be constituted simply and cheaply. [as / in the 2nd example]

0034] It is applicable not only to the circular substrate which has an orientation flat like the above-mentioned example as this invention but the rotating type substrate processor to square shape substrates, such as for which have a notch / a circular substrate, for liquid crystal, etc.].

0035]

Effect of the Invention] Where rotation of a substrate attachment component is suspended, according to the rotating type substrate processor of invention concerning claim 1, so that clearly from the above explanation When holding a substrate and rotating, going up and down a substrate rise-and-fall pin through a through hole, going up and down a substrate, and being able to carry in and take out a substrate Since a through hole is locked and air is not made to flow in the space of the letter of sealing through a through hole by covering device material Dirt generating of the rear face of a substrate or an end face resulting from the configuration which goes up and down a substrate for carrying in and taking out of a substrate could be avoided Myst flowing through a through hole, being able to avoid adhering to the rear face of a substrate with rotation of a substrate, and not making a substrate rear face produce the remains of a chuck.

0036] moreover, according to the rotating type substrate processor of invention concerning claim 2, where rotation of a substrate attachment component is suspended When holding a substrate and rotating, a press member being made to contact a substrate rise-and-fall pin, and going up and down a substrate rise-and-fall pin, going up and down a substrate, and being able to carry in and take out a substrate Where a substrate rise-and-fall pin is dropped according to an energization device, the space of the letter of sealing is maintained. Being able to avoid Myst flowing in the space of the letter of sealing, and adhering to the rear face of a substrate with rotation of a substrate, and not making a substrate rear face produce the remains of a chuck, since air is not made to flow in the space of the letter of sealing Dirt generating of the rear face of a substrate or an end face resulting from the configuration which goes up and down a substrate for carrying in and taking out of a substrate can be avoided now.

[Translation done.]

NOTICES *

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This document has been translated by computer. So the translation may not reflect the original precisely.
**** shows the word which can not be translated.
In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is whole outline drawing of longitudinal section showing the 1st example of the rotating type substrate processor of this invention.

[Drawing 2] It is the top view of an important section.

[Drawing 3] It is the perspective view of an important section.

[Drawing 4] It is the expanded sectional view of an important section.

[Drawing 5] the 2nd example of the rotating type substrate processor of this invention is shown — it is the whole abbreviation outline drawing of longitudinal section a part.

[Drawing 6] the 3rd example of the rotating type substrate processor of this invention is shown — it is the whole abbreviation outline drawing of longitudinal section a part.

[Drawing 7] It is the sectional view of an important section showing the 4th example of the rotating type substrate processor of this invention.

[Drawing 8] It is the bottom view of an important section.

[Drawing 9] The sectional view of an important section in which (a) shows the 5th example of the rotating type substrate processor of this invention, and (b) are the bottom views of an important section.

[Drawing 10] The bottom view of an important section in which (a) shows the 6th example of the rotating type substrate processor of this invention, (b), and (c) are the sectional views of an important section.

[Description of Notations]

— Substrate rotation means

— Substrate attachment component

3 — Through hole

7 — Substrate rise-and-fall pin

3 — Covering device material

1 — Covering device material

3 — Substrate rise-and-fall pin

3 — Compression coil spring

1 — Press member

— Space of the letter of sealing

— Substrate

[translation done.]